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STORMS AND WARNINGS—WEATHER AND CROPS.

STORMS AND WEATHER WARNINGS.

WASHINGTON FORECAST DISTRICT.

On the morning of June 1 pressure was low and falling over the eastern Gulf of Mexico and the northwestern Caribbean Sea, with a disturbance of slight intensity central over the latter region, and advisory warnings were issued daily until the 4th when the disturbance apparently filled up.

At 10:30 a. m. of the 16th the following advisory warning was issued:

Disturbance of moderate intensity over western Caribbean Sea central near coast of Honduras southwest of Swan Island this morning apparently moving slowly northwestward will be attended by fresh and strong shifting winds and rains in northwestern Caribbean Sea next 36 hours.

By the morning of the 17th the disturbance had increased somewhat in intensity and an advisory warning of strong shifting winds and probably gales was issued for the northwestern Caribbean Sea and the Yucatan Channel. During the following night the disturbance passed inland over British Honduras in the vicinity of Belize, continuing its slow northwestward movement, and a maximum wind velocity of 52 miles an hour from the southeast was registered at Progreso, Yucatan, as the storm entered the southwestern Gulf of Mexico during the early morning of the 19th.

No further reports were received giving the approximate location of the storm until the afternoon and evening of the 21st when it was central off the mouth of the Rio Grande. The warnings issued on the 21st and the morning of the 22d are noted below.

A delayed radio report from the S. S. *Sucrosa* (received during the afternoon of the 22d) showed a barometer reading of 29.28 inches and a wind velocity of about 75 miles an hour from the southeast at 10 p. m. of the 21st in latitude 26° 30' N. and longitude 95° W.

During the night of the 21st-22d the storm caused a maximum wind velocity of 68 miles an hour from the northeast at Corpus Christi and a strong northeast gale and high sea at Point Isabel, and by 8 a. m. of the 22d the wind was blowing 42 miles an hour from the east at Galveston, with rising tide. Special observations at 10 a. m. showed rising pressure at Corpus Christi and slowly falling pressure at Galveston and Houston, and the following bulletin was issued at 12 noon:

Tropical storm apparently moving inland over Texas coast vicinity Matagorda Bay. No further danger Corpus Christi southward.

At 5:30 p. m. the following bulletin was issued:

Tropical storm central southwest of Houston moving northward, Gales along Texas coast east of Matagorda Bay will diminish to-night,

The hurricane warnings were ordered down at 9:30 p. m.

The wind reached a velocity of 60 miles an hour from the southeast at both Galveston and Houston, and the lowest barometer reading at a land station was 29.37 inches at Houston at 5:40 p. m. of the 22d. The storm continued to move slowly northward, with diminishing intensity, over the eastern portions of Texas, Oklahoma, and Kansas, thence northeastward over the Lake region.

Another disturbance was apparently forming on the morning of the 24th over the northwestern Caribbean Sea in the vicinity of Swan Island whence it moved slowly westward over southern British Honduras and Guatemala and by the morning of the 28th it was causing

strong shifting winds and heavy rains over the southwestern Gulf of Mexico and also in the Gulf of Tehuantepec on the Pacific side. Advisory warnings were issued daily, based on delayed Mexican reports, until the 29th when the disturbance had apparently moved inland over Mexico. This disturbance was of much wider extent than the preceding one, but it apparently did not develop into a severe storm.

No storm warnings were issued during the month for the Great Lakes or the Atlantic and east Gulf coasts.

Frost warnings were issued for limited areas in the upper Lake region and the northeastern States on several dates during the first week of the month.—*Charles L. Mitchell.*

CHICAGO FORECAST DISTRICT.

No general warnings of any character were issued during the month in the Chicago forecast district.

However, frost warnings were sent to North Dakota points on the 2d and on the 3d to the lowlands of Wisconsin and Minnesota. On the latter date special warnings were sent to the Wisconsin cranberry marshes covering the ensuing two nights, the warnings being repeated to the marshes again on the 4th.

All the frost warnings were verified, except those issued on the 2d were only partly verified.

The advices sent to the cranberry marshes were especially beneficial, and the cranberry growers have expressed their great appreciation of the service.—*H. J. Cox.*

NEW ORLEANS FORECAST DISTRICT.

A tropical storm which had traveled from the Caribbean Sea across Honduras and southern Yucatan and thence northward through the Gulf of Mexico moved inland on the Texas coast, with its center passing near Matagorda Bay during June 22, 1921. Small-craft warnings were displayed on the Texas coast 9:30 a. m. on the 20th in anticipation of increasing winds. A 4 p. m. special observation from Brownsville, Tex., June 21, showed a fall in pressure of about 0.08 inch since 8 a. m., with rain falling; small-craft warnings were ordered for the Texas coast, 4 p. m., from Velasco to Brownsville. A 4:40 p. m. observation from Corpus Christi, Tex., showed a somewhat higher barometer than at 8 a. m., but the wind, 48 miles from the northeast, with heavy rain, and the tide high at Point Isabel and a storm tide of 4 feet at Corpus Christi Pass, indicated that the storm was moving toward the Texas coast, and the following warning was issued for the Texas coast, Port Arthur to Brownsville:

NEW ORLEANS, LA., June 21, 1921.

Hoist northeast storm warning, Texas coast 4:30 p. m. Disturbance apparently off mouth of Rio Grande, moving northeast; will cause increasing northeast winds and gales and rising tides.

CLINE.

The following storm bulletin from the central office was distributed to all authorized addresses at 9:40 p. m.:

WASHINGTON, D. C., June 21, 1921.

Storm bulletin: Storm of unknown intensity central off mouth of Rio Grande apparently moving north-northwestward. Shifting gales to-night north to mouth of Colorado River and probably as far as Galveston. Every precaution should be taken. Advise all interests.

MITCHELL.

Hurricane warnings were distributed at 9:25 a. m. on the morning of the 22d, as follows:

WASHINGTON, D. C., June 22, 1921.

Hoist hurricane warning 9:30 a. m., Texas coast, Matagorda Bay to Port Arthur, Tex. Tropical storm central off Texas coast east of Corpus Christi apparently moving northward increasing in intensity; it will cause dangerous shifting gales to-day along the Texas coast between Corpus Christi and Port Arthur.

MITCHELL.

Northeast storm warnings were issued for the southwestern portion of Louisiana and the following wind forecast was sent to all stations on the Louisiana coast: "Increasing easterly winds Wednesday afternoon and night; dangerous tides on the coast"; signed, "Cline."

The following wind forecast was telegraphed with the forecast to all authorized points in southeastern Texas:

Strong northeast winds and gales in southeastern portion of Texas this afternoon and to-night, becoming northerly and westerly Thursday and subsiding. High tides on the east coast.

CLINE.

No storms occurred without warning.—*I. M. Cline.*

DENVER FORECAST DISTRICT.

The outstanding feature of the weather for June was an area of high pressure which appeared over Alberta on the 1st and which had covered the northeastern Rocky Mountain slope by the morning of the 2d. This HIGH, in conjunction with a LOW that developed about the same time over the Rocky Mountain Plateau, was the cause of showers long the eastern slope from the night of the 1st-2d to the night of the 5th-6th, during which time some of the heaviest rains of record fell on the eastern slope of the Continental Divide in Colorado and in northern and eastern New Mexico. Especially heavy local downpours occurred over the Arkansas drainage basin above Pueblo during the afternoon and evening of the 3d and were followed by the disastrous flood at that city, although the rainfall was everywhere sufficient to raise the smaller streams of the eastern slope to the flood stage.

Twenty-four hour amounts of precipitation of more than 2 inches were common from Boulder County southward to Pueblo and the eastern portion of Fremont Counties on the 3d and 4th. It appears that the heaviest rains occurred from Penrose to Pueblo, including the drainage areas of Pecks, Rock and Boggs Creeks, and probably from Fountain to Pueblo. Although there are few reliable data for this region, the fact that the total rainfall exceeded 10 inches at a few places during the period from the 3d to the 7th seems to have been fairly well established.

The HIGH already referred to was followed on the 6th by another and more moderate area of high pressure on the eastern slope and in the upper Missouri Valley, the showers continuing in the same territory through the 7th, although the rainfall was much lighter.

An area of low pressure developed on the Rocky Mountain Plateau on the 10th and was attended by high temperatures until the 14th, causing a rapid melting of the more than usual amount of snow which remained at the higher elevations and producing exceptionally

high stages in the streams of western Colorado, northwestern New Mexico and eastern Utah.

The usual summer distribution of air pressure prevailed during the latter half of the month. High temperatures in most of the Denver district from the 27th to the 30th resulted from extensive lows which covered about all of the Rocky Mountain region and western Canada.

Freezing temperature was forecast for extreme southwestern Colorado, extreme northwestern New Mexico, north central and extreme northeastern Arizona, and the higher elevations of extreme southeastern Utah on the morning of the 1st. Minimum temperatures of 30° and 36° were recorded at Flagstaff and Durango, respectively, on the following morning. Freezing temperature was also forecast on the morning of the 18th for the higher elevations of northern Arizona. The reading of the minimum thermometer at Flagstaff on the morning of the 19th was 30°. A temperature of 30° occurred at Flagstaff on the morning of the 18th for which no prediction was issued.—*J. M. Sherier.*

SAN FRANCISCO FORECAST DISTRICT.

The month was marked by a large number of rainy days in western Washington, but in other portions of the district neither the amounts of rainfall nor the number of rainy days were more than usual. Storms from the North Pacific passed inland at a high latitude and their influence was confined to the extreme northwest portion of the district.

Three well-defined depressions formed over the interior of California and the southern plateau: The first in the early part of the second decade, the second in the first part of the third decade, and the third near the close of the month. The first gave showers over a large portion of the district; the second caused many thunderstorms in the mountain sections but little or no rain fell at the regular stations; and the third gave rain in the North Pacific States extending south along the coast to Point Reyes. A secondary depression from a storm over the Northern Plains States developed over the southern plateau on the 15th, and moved rapidly southeast followed by an area of high pressure from the northwest. This movement caused a sharp fall in temperature in Nevada on the 16th, with heavy to killing frosts on the mornings of the 16th and 17th.

Fire-weather warnings were issued in northern California on the 9th and 21st. The first read, "Very warm weather with moderate hot drying northerly winds for the next two or three days." The second, "Thunderstorms this afternoon and to-night in the mountains with cooler weather." Both of these warnings were timely and fully verified.

The following commendation was received from the Signal Corps meteorologist, at March Field (near Riverside, Calif.):

The forecasts are appreciated at this field and they have come to prepare for things according to what the forecast is, and it is always correct.

No storm warnings were ordered during the month.—*G. H. Willson.*